Ain Shams University
Faculty of Women for Arts, Science and Education

Growth promoting and phytopathogen antagonistic effects of rhizobacteria: Application on *Phaseolus vulgaris* L. in Gaza Strip

A thesis

Submitted in Partial Fulfillment of The Requirements for the Doctor of Philosophy Degree in Science (Microbiology)

By

Niddal Saleem Salman Abu Hujier

M.Sc. Biological Sciences/Medical Technology

Under Supervision

Prof. Dr. Mona Ishak Fahd
Prof. of Microbiology,
Botany Department,
Faculty of Women for Arts, Science and Education, Ain Shams University

Prof. Dr. Fadel Akram Sharif
Prof. of Molecular Biology,
Medical Technology Department,
Faculty of Health Science,
Islamic University of Gaza

Dr. Shimaa Mohamad Abdelsalam
Lecturer of Microbiology,
Botany Department
Faculty of Women for Arts, Science and Education, Ain Shams University

Ain Shams University
Faculty of women for Arts, Science and Education
Botany department
(2019)

PhD Thesis

Name: Niddal Saleem Salman Abu Hujier.

Title: Growth promoting and phytopathogen antagonistic effects of rhizobacteria: Application on *Phaseolus vulgaris* in Gaza Strip.

Scientific degree: Philosophy Doctor of Science (Microbiology).

Department: Botany.

Faculty: Faculty of Women for Arts, Science and Education.

University: Ain Shams University.

This thesis has not been previously submitted for any degree at this or any other university

Signature

Niddal Saleem Salman Abu Hujier

Supervisors

Prof. Dr. Mona Ishak Fahd
Prof. of Microbiology, Botany Department,
Faculty of Women for Arts, Science and Education,
Ain Shams University

Prof. Dr. Fadel Akram Sharif
Prof. of Molecular Biology, Medical Technology Department,
faculty of Health Science,
Islamic University of Gaza

Dr. Shimaa Mohamad Abdelsalam
Lecturer of Microbiology, Botany Department
Faculty of Women for Arts, Science and Education
Ain Shams University

Approval Sheet

Approved by	Signature
Prof. Dr. Mona Ishak Fahd Prof. of Microbiology, Botany Department, Faculty of Women for Arts, Science and Education, Ain Shams University	
Prof. Dr. Fadel Akram Sharif Prof. of Molecular Biology, Medical Technology Department, faculty of Health Science, Islamic University of Gaza	
Dr. Shimaa Mohamad Abdelsalam Lecturer of Microbiology, Botany Department Faculty of Women for Arts, Science and Education Ain Shams University	

Acknowledgements

My thanks go to ***Prof. Mona Ishak Fahd***, my great supervisor who has seen me through this whole process, for her positiveness, intelligence, love of excellence, love of healing, very nice comments, and discussion.

To ***Prof. Fadel Akram Sharif***, without his efforts and creative ideas any of this would be possible, who walked so much of this journey with me, I also offer from my heart thanks.

I have been very well supported by ***Dr. Shimaa Mohamad Abdelsalam***, who let me know she believed in the value of my work, and was always willing to lend practical support.

I have felt supported by ***University College of Science and Technology***, Khan Younis. I am very Thankful for their help.

My ***mother***, ***father*** who deserves special thanks, ***sister*** and ***brothers*** contributed greatly on this. I thank them for always being at my side. I am so proud of them.

I would like to thank my ***beloved wife*** for moral help.

I would like to extend my sincere thanks to the staff molecular lab in Islamic University of Gaza.

I would like to show my greatest appreciation to Ministry of Agriculture in Gaza for their support and help.

Niddal Saleem Salman Abu Hujier

Contents

List of tables